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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,764	08/14/2003	Wei Wen Chen	9815-US-PA	1763

31561 7590 09/16/2004

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER	
LEE, HSIEN MING	
ART UNIT	**PAPER NUMBER**
2823	

DATE MAILED: 09/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/604,764	CHEN ET AL.	
	Examiner	Art Unit	
	Hsien-Ming Lee	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-15 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE
PRIMARY EXAMINER

9/15/2004

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2 and 8-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Fastow et al. (US 6,750,157).

In re claims 1, 2, 8, Fastow et al. teach the claimed fabrication method for a silicon oxide/silicon nitride/silicon oxide structure layer, comprising:

- forming a first silicon oxide layer 520 over a substrate 500 (Fig.5 and col. 11, lines 28-29);
- forming an interface layer (i.e. a nitridated silicon oxide or silicon oxynitride) over the first silicon oxide layer 520 by exposing the surface of the layer 520 to a nitrogen ambient such as NO_2-containing plasma 550 (Fig.6 and col. 11, lines 34-40);
- forming a silicon nitride layer 545 over the interface layer (Fig.6 and col. 11, lines 62-63); and
- forming a second silicon oxide layer 595 over the silicon nitride layer 545 (Fig.11).

In re claim 9, Fastow et al. also inherently teach that the interface layer serves as seed for forming the silicon nitride layer since similar process can reasonably be expected to yield

product which inherently have the same properties. *In re* Spada 15 USPQ2d 1655 (CAFC 1990); *In re* DeBlauwe 222 USPQ 191; *In re* Wiegand 86 USPQ 155 (CCPA 1950).

In re claim 10, with the teachings against claim 1 Fastow et al. also teach forming a first silicon oxide layer 520 over a substrate 500; performing a surface treatment process (i.e. plasma nitridation) over the silicon oxide layer 520 to convert a surface of the silicon oxide layer 520 to a thin silicon oxynitride layer (i.e. the interface layer); forming a silicon nitride layer 545 over the surface-treated silicon oxide layer 520; and forming a second silicon oxide layer 595 over the silicon nitride layer 545.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 3-7 and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fastow et al. (US '157) in view of Gardner et al. (US 6,323,519).

In re claims 3 and 11, Fastow et al. teach exposing the first silicon oxide layer 520 to N_2O ambient, not to ammonium.

However, ammonium has known as an art-recognized equivalent ambient to N_2O in nitridation process, as evidenced by Gardner et al. Gardner et al. teach using nitrogen-bearing gases for nitridating silicon oxide, in which the nitrogen-bearing gases comprise N_2, N_2O and ammonia (col. 8, lines 13-17 and 41-48).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to substitute N_2O of Fastow et al. with ammonia of Gardner et al. for the reasonable expectation of success (i.e. achieve same purpose, incorporating atomic nitrogen into silicon oxide to form silicon oxynitride).

In re claims 4 and 14, the selection of the pressure for forming the interface layer in nitridation is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. See M.P.E.P. 2144.05, III In fact Fastow et al. suggested that the pressure can be chosen as desired so as to sufficiently incorporate the nitrogen atoms into the surface of the first silicon oxide (col. 13, lines 50-54).

In re claims 5-6 and 12-13, the selections of the temperature and time for forming the interface layer in nitridation are obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. See M.P.E.P. 2144.05, III In fact Gardner et

al. teach that the nitridation can be performed at a temperature from 300 °C to about 700 °C for from about 30 seconds to about 10 minutes, which is within the claimed range, as recited in claim 6 (col. 8, lines 24-25 and 51-52).

In re claims 7 and 15, this claim is prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688(Fed. Cir. 1996)(claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious). In fact, the thickness of interface layer (i.e. nitridated silicon oxide or silicon oxynitride) is process dependent, dependent upon the temperature, the processing time and the intended degree of reducing charge leakage, in which Fastow et al. suggested that the interface layer acts as charge leakage reducing layer (col. 11, lines 34-38).

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (8:00 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HSIEN-MING LEE
PRIMARY EXAMINER

Hsien-Ming Lee
Primary Examiner
Art Unit 2823

Sep. 15, 2004

9/15/2004